RoboCasa: Large-Scale Simulation of Everyday Tasks for Generalist Robots

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Abstract

Recent advancements in Artificial Intelligence (AI) have largely been propelled by scaling. In Robotics, scaling is hindered by the lack of access to massive robot datasets. We advocate using realistic physical simulation as a means to scale environments, tasks, and datasets for robot learning methods. We present RoboCasa, a large-scale simulation framework for training generalist robots in everyday environments. RoboCasa features realistic and diverse scenes focusing on kitchen environments. We provide thousands of 3D assets across over 150 object categories and dozens of interactable furniture and appliances. We enrich the realism and diversity of our simulation with generative AI tools, such as object assets from text-to-3D models and environment textures from text-to-image models. We design a set of 100 tasks for systematic evaluation, including composite tasks generated by the guidance of large language models. To facilitate learning, we provide high-quality human demonstrations and integrate automated trajectory generation methods to substantially enlarge our datasets with minimal human burden. Our experiments show a clear scaling trend in using synthetically generated robot data for large-scale imitation learning and show great promise in harnessing simulation data in real-world tasks. Videos and open-source code are available at https://robocasa.ai/